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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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# BRANCH OF RESEARCH

## MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST ECONOMICS

FOREST PRODUCTS

RANGE RESEARCH

MAY 1931







## BRANCH OF RESEARCH

June, 1931.

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## FOREST EXPERIMENT STATIONS

### APPALACHIAN FOREST EXPERIMENT STATION

#### Forest Management in North Georgia

With Bonnell Stone, Barrett spent the entire month in the vicinity of Blairsville, Ga. Two areas were located for studying the release of white pine regeneration by girdling and poisoning the hardwood overstory. Eight plot boundaries were surveyed and the corners permanently marked. The Sosebee Cove stand of yellow poplar was visited with Frothingham and plans made for the establishment of permanent growth strips on this tract. This stand has been considered for a natural area reserve.

The increasing area of Virginia pine in northern Georgia, due to the seeding in of this species on old fields, presents an interesting and important problem. Two reproduction strips were established adjacent to a 34-year old stand of Virginia pine. The area on which the strips were established was previously hardwood. Sawtimber was cut over during the winter of 1929-30. An excellent stand of 1 and 2-year old pine seedlings is already on the ground. The reproduction strips will show the distance from a stand of seed trees that desirable stocking will take place and will also provide means for a study of Virginia pine regeneration in competition with hardwood sprouts. A permanent yield strip, 18 chains long and 1 chain wide, was established in a cut-over stand of mixed hardwoods on the Georgia Mountain Experiment Station woodland. This strip is the beginning of a more extensive growth study on the Station woodlands.

#### Loblolly Pine Selective Logging Study

MacKinney with two assistants spent practically the entire month with four representatives of the Forest Products Laboratory on a mill-scale study in the woods near Witherbee, S. C., and at the mill near Charleston, S. C.

This study was initiated to complete the group of combined selective logging and millscale studies in loblolly pine stands in the middle Atlantic Coastal Plain. The two previous studies carried on in 1929 and 1930, were made in stands of loblolly pine and mixed hardwoods and old field loblolly pine. The present study was made in a stand of loblolly and longleaf pines which had been cut over 40 years ago. It was very open, containing about five million board feet Doyle scale per acre, and was composed of older trees left at the time of the last cutting and other trees which had come in since. The open character of the stand was probably due in large part to the annual or biennial fires to which the area has been subjected for many years.

(Over)

Four plots of four acres each were established and all trees on them measured. The plots were then marked for cutting in the following ways:

- Plot 1. One seed tree reserved per acre.
- " 2. Three seed trees " " "
- " 3. Five " " " "
- " 4.a. Two acres for selective cutting.
- " 4.b. Two acres for commercial cutting practice.

The area studied did not lend itself to selective cutting practices because the stand was open and composed mainly of trees 12 inches d.b.h. and over. On plot 4 the selective cutting resulted in a residual stand containing less than 300 board feet per acre and offering little promise for the future because the trees left were quite knotty and of relatively poor form. It was felt that the only practical method of cutting available for use on the area was the removal of the entire stand except for a few seed trees per acre. This practice coupled with adequate fire protection will undoubtedly result in a dense stand of loblolly pine reproduction which will completely restock the area in a few years and yield a good return at the end of the rotation.

During the felling of the trees sections were taken from 21 trees which had been present when the area was cut over previously. The data obtained from these sections will be used in the study of increased growth and changed in form of loblolly pine left following cutting.

Although the data for the study are not yet compiled, the higher per cent of clear lumber obtained from the trees showing increased growth was very striking as the study logs went through the mill..

#### Controlled Burning in Southern Pines

The permanent sample plots at Lanes, S. C., were given their third annual spring examination. The examination brought out more forcibly than usual the inability of loblolly pine seedlings and saplings to withstand fire. Spots of loblolly pine reproduction which had previously escaped burning were in many cases wiped out by the fire of March, 1931, which although it burned over most of the area, was not severe.

#### Management of Loblolly Pine

Two one acre plantations of loblolly and slash pines on the Clemson College Coastal Experimental Farm at Summerville, S. C., were examined to determine survival after the first three months in the field. The loblolly pine seedlings, although in much poorer condition than the slash pines, at the time of planting, showed approximately 10 per cent greater survival.



## Forest Entomology

Huckenpahler arrived in Asheville on May 1, to spend the summer at Bent Creek in the employ of the Bureau of Entomology. During the month he located in the experimental forest the areas where pines have been killed by the dendroctonus beetle during the past ten years. The data collected substantiate the theory that a correlation exists between years of drought and those of beetle epidemic. Records will be made annually in the future of all areas of beetle attack.

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## CALIFORNIA FOREST EXPERIMENT STATION

### General

The emergency unemployment funds have made possible the completion of improvements at the Devil Canyon and Stanislaus centers, which have been lacking for many years. Construction of the large experimental tanks at Berkeley, also from these funds, is about completed. These tasks have somewhat disrupted the normal program but in a month or two we will recover lost ground and be far ahead in our ultimate program.

The preparation of the California section of the revised Capper report for the Timber Conservation Board has raised many vexing points of procedure which not being covered by instructions, may lead to lack of consistency between regions. These have been ironed out for our own report in accordance with our best lights. The careful provision for supporting data with record of sources of data and method will give this report tremendously greater reference value than the older one had, as our united best thinking on a range of subjects, many of which would not otherwise have been rounded up at all.

### Forest Management

#### Pine Region

Emergency unemployment activities provided emergency employment for most of the management staff during May. Plans were prepared for a 2-room office and laboratory and a bedroom extension at the Stanislaus Branch, a water and sewer system, 3 miles of plot fences and several miles of fire lines and boundary clearings about sample plots, on the Plumas, Stanislaus, and Sequoia. This work is progressing rapidly. Morrow came from Feather River to do an excellent job on the water system at the Stanislaus Branch.

Lloyd has completed installing a series of seasonal diameters and height growth studies on the Stanislaus, using Reineke's dendrometer.

Two more permanent sample plots were destroyed in the Lassen by an unauthorized change of location by the Western Pacific Railroad. Apparently everything was destroyed but the "Do not disturb" signs.

### Redwood Region

During the first week of May Person assisted Hammatt and Wieslander with the redwood section of the Capper report revision. Most of the remainder of the month was spent in company with Wieslander on a trip through the redwood region. The purpose of the trip was to determine what maps and timber cruises are available for use in preparing the cover type map and also to increase our knowledge of the cover types, vegetation, and general conditions in the redwood region.

The assessors or surveyors of the three northern counties, Del Norte, Humboldt, Mendocino were interviewed and the available map and cruise data noted for each county. Both Del Norte and Mendocino counties have maps and cruises available for the timbered areas. There is a good general map of Humboldt County, and it is hoped that timber cruises will be made available through the courtesy of the redwood timber owners and operators. Mr. Hine and Mr. Dalton of the Holmes-Eureka Lumber Company, Howard Dessert of the Dessert Redwood Company, and W. R. Schofield, Chairman of the Humboldt County planning commission were all interviewed and their support was promised.

Most of the passable roads through the timbered areas of Del Norte and Humboldt counties were covered and a large number of photographs showing types and conditions were taken and a great many plant specimens were collected.

### Cover Types

With the end of May the cover type project faces a serious loss in experienced personnel. Ray Clar, State Ranger, who has been assigned to the project since August 1927, leaves to serve as assistant to the State Ranger in Mendocino County and to make observations on effects of controlled burning for agricultural clearing which is to be done under supervision of the State Division of Forestry. Clar has assisted Wieslander in Supervision of field work and in the office his special aptitude for map work has made him invaluable in compilation of the small scale statewide cover type map. Field Assistant F. H. Raymond, who has done outstanding work on the cover type project since August 1929, will shortly join the State Forester's organization as Assistant State Ranger of Monterey County. As Raymond has typed practically all of Monterey County, his knowledge of that region should make him a very valuable ranger in that locality.

Arrangements have been made with the Office of Blister Rust Control through Wyckoff and Benedict for the typing of sugar pine areas in Humboldt and Siskiyou counties this field season in connection with their Ribes Survey. On May 19 Wieslander and Person met Mr. Harris, who will have charge of the field parties at Orleans, Humboldt County, and the mapping technique and designation of types were explained to Mr. Harris in the field.

Excellent reports on type work on the National Forests have been coming in. Decline in the timber sales business on the National Forests has been so much gain to the cover type project. On the Stanislaus practically the entire timber sales force has been assigned and over half the forest has been typed at this date, by actual field work where accurate cruise data are unavailable.

### Fire Research

Practically the entire month was spent in the field on the Shasta Experimental Fire Forest Area. Visibility maps made by the profile method were checked by occupying the peaks. Only a very few minor changes were necessary. Some few small areas were shown as seen by the profile method which were invisible. This was due mainly to tree cover on a few intervening ridges. Slight additions had to be made to the seen area. The changes involved very small areas. Therefore it appears that the type of topographic map with which we were working (enlargement of the U.S.G.S. quadrangles to 1" scale) allows a sufficiently accurate visibility map to be prepared by the profile method. The same holds true of the 1" topographic map prepared by the Office of Engineering, as we are using these for a large part of the Experimental Area.

In addition to checking past work, additional lookout points were occupied in the east side of the Shasta and visibility maps prepared. The difficulty of delineating the boundaries of visible areas was greater in this region due to the large expanse of flat country surrounding the points occupied. However, the extra time required is compensated for by fact that there are considerably fewer points to occupy.

Three guard training camps were held by the Shasta Forest. The fire research staff participated in these meetings in training lookouts in their duties, - map reading, methods of observation, use of the alidade, reporting and action, forms, etc. The response was excellent and both the old and the new lookouts seemed to get considerable out of the training efforts.

A graphic chart made from several lookout stations for the dual purpose of an administrative device to require systematic observation by the lookout man of his territory and to furnish data on visibility conditions which will later be analyzed by the experiment station. These

visibility conditions include time of day when there is a change in visibility conditions and the distance to which a lookout can be expected to see. From this time of change each day, the days out of each month, the percentage of time each month during which a lookout can be considered effective may be determined for different distances.

The chart is made on a one-half inch to the mile scale, which allows coverage for an area of 20-mile radius on an atlas size sheet. Concentric circles are drawn to show 5 miles, 10 miles, 15 miles, and 20 miles distances from the lookout station. The north-south and east-west lines are drawn through the center of the circles. This gives the blank base on which the chart is made. The following procedure is followed in selection and plotting of the material targets for observation:

1. Natural features are selected as targets.
  - a. Care is taken that these targets do not show up too conspicuously in order that the eye has to search the landscape to pick them up.
  - b. Targets are selected azimuths entirely around the circle and at different distances.
  - c. The distances are staggered so that observation #1 is made at 4 miles, #2 at 7 miles, #3 at 13 miles, #4 at 5 miles, #5 at 8 miles, etc. These distances vary according to the distance of natural targets from each individual lookout point. The purpose of staggering the distance is to compel the eye to change focus and thus enable the eye to pick up smokes at intermediate points.
2. The location of the target is plotted on the chart at the proper azimuth as determined by an alidade shot and at the proper distance from the lookout points as determined by tying in to known topographic or cultural features.
  - a. A small sketch of the target is made to resemble the target. For example, a forked tree is drawn on the chart to show this target. A stretch of road is sketched if the road is the target. Other examples of targets picked are a small brush patch, patches of reproduction, openings or lanes between trees, large rocks in brush, ridge intersections, slides, gullies, outline of one hill against the side of another, peculiar shaped trees, small flats showing in the timber, airplane beacon towers, fence lines, cabins, etc. The size of the object selected depends on the distance from the observer. For most points eight targets in each quadrat are sufficient. This requires 32 targets for the

complete circle unless the lookout has his vision restricted in certain directions. In other words there are eight targets from due north to east and there are two targets within the 5-mile circle, 3 within the 10-mile circle, and 3 within or close to the 15-mile circle. This lends interest to the observer who will be the regular lookout man.

- b.b. In addition the description of the target is printed to one side of the sketch.
  - c. A line tipped with an arrow is drawn from the target sketch toward the center until it intersects the next distance circle. In blue ink the correct azimuth reading is printed along this line to guide the lookout in locating the point when he is learning his targets.
  - d. The sketch of the targets are numbered in red clockwise around the circle in order of the azimuth readings. This is for convenience in recording the visibility, since the form to be described below has the targets numbered rather than described.
3. The visibility conditions are noted and recorded under three heads - plainly seen, dimly seen, and not seen. The observations are taken every fifteen minutes. By actual test the time required for this systematic observation and recording is around seven minutes out of the fifteen minute period. Familiarity gained by practice will reduce this time to 5 minutes.

The following is a sample of the form used:



Forest: Shasta. Lookout: Black Fox (Jas. Stewart.) Date: 5/19/31.

Target - -	:	1	:	2	:	3	:	4	:	5	:	6	:	7	:	Etc.	Remarks
Time	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
8 (00	:	P	:	P	:	P	:	D	:	D	:	D	:	X	:		Smoke from
(15	:	P	:	P	:	P	:	P	:	D	:	D	:	D	:		Fire or
(30	:	P	:	P	:	P	:	P	:	D	:	D	:	D	:		Haze or
(45	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		Fog or
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		Heat Haze
(00	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		etc.
9 (15	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
(30	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
(45	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
etc.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
to	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
6 p.m.	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		

#### Legend:

P = plainly seen

Sunset P.M.

Sunrise A.M. at peak

D - dimly seen

x - not seen

#### Fire Damage

The quadrats on the area at Kern Ridge on the California National Forest were reexamined as has been done annually since the experimental burn in 1920 and 1921. Annual vegetation was recorded by species and numbers. Perennial vegetation and reproduction was tagged, plotted, and recorded. Conclusions will be drawn after more observations are made and the data analyzed.

It has been evident throughout the period of observation that light burning does not increase the forage species in the burn and that the timber line is pushed back when a fire occurs at the junction of the brush type and the timber type.

#### Office of Forest Products

#### Woods and Mill Study

Computations on the Stanislaus woods and mill study have gone ahead steadily. The curves for the yield of lumber by grades and thickness groups from logs, and from trees have finally been completed and tabulated.

Work this month has been directed to balancing the gross tree volume, cull factor, tree overrun, and lumber tally curves so that the 5 common and better curve minus the overrun curve plus the cull scaled at the mill and the cull and breakage in the woods curves will produce the gross tree volume curve. A sizeable amount of time was also spent in computing overrun and sawing time curves for the Regional Logging Engineer. Included in this work was an analysis of the effect of defect on sawing time. In white fir logs, for example, all logs containing cull (up to 66%) were found to require more time at the headsaw than sound logs of the same size. Logs of 40% defect required the maximum, namely 20% excess of time over sound logs. This figure is a good deal higher than had been anticipated and some further work is necessary before it can be used with assurance.

### White Fir Bulletin

Brundage has devoted most of the month to the preparation of material for this projected Forest Products and Regional joint bulletin.

### Capper Report Revision

Hill has devoted most of the month to material for this project, with a considerable slice of time taken on issuing the Regional Investigative Committee report.

### Consulting Entomologist

Some experiments to determine methods for the control of the fir-engraver beetle were started by G. R. Struble in April. Two large screen cages were constructed on the Oxford Street Tract at Berkeley in which controlled attacks of the beetles in green fir logs will be carried on. The first test has been made with "flu-si dust", a commercial insecticide, to determine whether dusting the tree trunks with this substance will prevent attack by the beetles.

Two shelters were also constructed on the Station grounds to house the metal insect cages used by Person last season. This equipment will be employed at Berkeley for rearing insect material collected and sent in by the survey crew during the course of the season.

R. N. Jeffrey has recently completed the sugar determinations from the phloem samples of western yellow pine collected on the Modoc last season, and is now working up the correlations as a basis for his report on this project. During the coming season Jeffrey will initiate a series of experiments at the Berkeley laboratory to determine the materials in the tree that are essential to the nutritional requirements of the western pine beetle.

It is planned to establish permanent sample plots on the Modoc, Lassen, and Sierra National Forests during the coming season, and a regional forest insect survey crew, under the direction of Dr. K. A. Salmon, started this work on the Modoc May 12. The other members of the crew are F. W. Bacon, E. F. Wohletz and F. A. Meckel. An experiment on the Devil's Garden area will also be conducted to determine the feasibility of western pine beetle extermination.

R. L. Furniss, who reported at Berkeley May 2 under appointment as field assistant, will spend the summer at Klamath Falls, Oregon, in company with J. A. Beal, on a study of the effect of a logging operation upon the surrounding pine beetle infestation.

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### CENTRAL STATES FOREST EXPERIMENT STATION

#### General

#### Personnel

The Bureau of Entomology has assigned Mr. R. C. Hall to work on the study of the locust-borer in the Central States Region. Hall will be headquartered at the Central States Station and will be assisted by two temporary employees. He will do his work in conjunction with the study of yield in plantations of black locust, conducted by Kellogg. Hall reported on June list at Columbus.

The Station is employing six temporary assistants in field work during the summer season.

A. G. Chapman will be assigned to the locust yield party but is also interested in relation of nitrogen fixation in locust plantations. He plans to study the influence of bacterial colonies located on the roots of black locust and the fixation of nitrogen in the soil. This work will be undertaken as a part of the requirement for his Doctors degree and will be carried on independent of the station's activities.

#### Research Council

The Central States Forest Research Council met at St. Louis on May 26.

Following the meeting, six members of the group made a trip of two days thru the Ozark region under the guidance of Paul C. Dunn. Other members of the Council delayed the trip to the Ozarks to join in the

field trip following the meeting of the National Association of State Parks.

The Council reviewed the current year's program of the Central States Station without recommending material change. A committee appointed in 1930 to recommend a program of procedure for the Council rendered a report which was approved by the Council. In accordance with this program a summary of past, current and proposed forest research will be assembled and submitted at the next meeting of the Council. President Pershall indicated the willingness of his company to undertake research problems on the company's land under competent direction furnished by research agencies.

Mr. C. Vivian Anderson was elected president of the Council for the coming year. Mr. Tom Wheeler was continued in the office of vice-president and Mr. McCarthy as secretary.

Mr. Anderson is taking an active part in arranging for the coming meeting of the Central States Forestry Congress which will be held in Cincinnati this fall. Mr. Anderson indicated to the Council his program for furthering this meeting which promises a record attendance.

#### Cooperation

#### Plantation Study (Fp-1)

Preparations for the coming field work on plantation black locust were made by Kellogg during a portion of the month. In anticipation of work in Indiana, he went to Indianapolis to secure locations and notes on older locust plantings in that state from the very fine records made by former State Forester C. C. Deam. Almost without exception, the locust borer (*Cyllene Robiniae*) appeared in these plantings. Sometimes the trees were only 1-2 years old when attacked and only occasionally did a planting become 10 years old before the borer work was evident.

#### Scotch Pine Plantation

The 1931 remeasurements of the Scotch pine planting at the Columbus Boy Scout camp were compiled by Kellogg early in the month. It is quite apparent that the drouth of 1930 which injured hardwoods so severely in the Central States Region, did not injure this planting appreciably, if at all. The planting was carefully made in 1929 with large 3-0 or 2-1 stock.

Growth in Scotch Pine Plantation      Columbus, Ohio.

	<u>1929</u>	<u>1930</u>	<u>1931</u>
	<u>Feet</u>	<u>Feet</u>	<u>Feet</u>
Highest Tree	1.07	2.2	3.3
Shortest tree	0.4	0.6	1.0
Av. ht. of all trees	1.08 $\pm$ 0.25	1.43 $\pm$ 0.31	2.08 $\pm$ 0.45
Av. ht. growth 1 year	-	0.35 $\pm$ 0.15	0.66 $\pm$ 0.23

Even in the year of drouth, the height growth was found to have increased from 0.35 to 0.66 feet, or about 83 per cent.

In April, 1930 rabbit damage was found on 50 per cent of the trees. It was expected that those whose tips and needles had been eaten would be dead this year. Not a single blank was found, and those which had been completely stripped of needles and tips have produced new buds and needles and are still alive. Moderately damaged trees were found to have made a thrifty 1930 growth in spite of their injury. Repeat photographs were taken on the same trees as in 1930.

Red and White Pines

The vigor which the Scotch pine is displaying is quite surprising. Fortunately areas of red and white pine were planted in 1930 adjacent to the Scotch pine and Kellogg placed plots in these plantings this spring in order to make a comparison of the three species.

Large Red pine stock of unknown but probably 2-1-2 size was used. The white pine was about 2-3 and was small stock. Survival was found to be 93.7 per cent for the red pine and 92 per cent for the white pine.

Comparison of the three species follows:

		White Pine	Red Pine	Scotch Pine
Av. Ht. at time of planting		0.86 $\pm$ 0.23*	0.93 $\pm$ 0.30*	1.08 $\pm$ 0.25
Av. Height	1930	-	-	1.43 $\pm$ 0.31
Av. Ht.	1931	1.14 $\pm$ 0.31	1.32 $\pm$ 0.36	2.08 $\pm$ 0.45
Growth	1929-1930	-	-	0.35 $\pm$ 0.15
Growth	1930-1931	0.28 $\pm$ 0.12	0.42 $\pm$ 0.10	0.66 $\pm$ 0.23
* 1930	** 1929			

State Forester of Indiana

The Annual Conference of Governors at French Lick, Indiana, gave an opportunity to place exhibits on Forestry before them. The Station assisted State Forester Wilcox and J. F. Kaylor in their plans by preparing photographic exhibits of types of erosion, forest soils, a graphic map of forest land by counties and several panels of plantation pictures. Kellogg spent 4 days helping to gather material together and assisting Kaylor and Randall



in setting up the exhibit. The main feature of the exhibit was a splendid erosion model "Forested vs Denuded land" equipped with actual "rainfall" to show clear streams vs yellow muddy run-off. A colored panel on erosion was loaned by the Washington office for the exhibit.

Day delivered one talk before the class of farm forestry during the month.

### Sycamore Blight

During the past three weeks, severe injury has been observed in connection with the native sycamore trees resulting in the loss of leaves amounting in some cases to almost complete defoliation. While some injury was done by frost killing of the buds, it has been accompanied by an attack of parasitic fungus which works on the cambium layer of the twigs, causing complete or partial girdling of the twig. This injury has been observed from Central Illinois to Eastern Ohio and is so severe that many trees now seem to be on the verge of dying. They may recover thru development of adventitious buds on the larger limbs. The disease has been tentatively identified as Sycamore Anthracnose which has been present in the region for several years. Further study may reveal another cause.

### Woodland Grazing (Pa-1)

#### Livestock Management Phase

Arrangements have been completed with Dr. Stanley A. Cain of Butler University to cooperate with Purdue Agr. Exp. Station and this station in the study of carrying capacity of the oak-hickory woods on the Pinney Purdue farm. This was reported in March. While the primary purpose of this study is to determine the pasturage value of the woods, at the same time three fenced plots about twenty feet square and three unfenced plots subject to grazing have been established on each of the three tracts. This makes a total of eighteen plots where a record of vegetation will be kept.

The desirability of making a detailed ecological study of the changes in vegetation on these plots was early recognized but since neither Purdue, ourselves or the Division of Range Research could supply a man, the opportunity was offered to Dr. Cain.

Dr. Cain is familiar with the work which is being done on the western ranges and is well qualified to make the study. He plans on establishing several meter square quadrats within each of the fenced and unfenced plots and will make about three counts during each grazing season.

Day and Dr. Cain visited by Pinney Purdue farm on May 15 at which time the cattle had been in the woodlots for two weeks. The three head in the eighteen acre tract were apparently in good condition and but little evidence of browsing was visible. In the twelve acre tract the animals were in about as good condition but there was some evidence of browsing on the black cherry which represents about 80% of the tree reproduction on the tract. Considerable browsing both of black cherry and of blackberry briars were noted in the six acre tract and the cattle were already showing decreased weight.

### Phenology

The crop of beech, elm and ash seed through Ohio and Indiana appear to be unusually heavy this year. Joel Kincaid of Warsaw, Indiana states that in 1909, the year following the great drouth in Northern Indiana, the beech trees were heavily laden with seed. Whether good seed crops follow periods of drouth is a matter speculation, but may result from changes in the carbohydrate-nitrogen ratio.

### Litter Study (M-1)

Auten continued analysis of calcium and magnesium content of forest litter and surface soils on samples collected during the past field season.

He finds a distinct tendency toward accumulation of calcium and magnesium carbonates in the surface horizon and litter in all forest soils. Even white pine litter showed 42,700 lbs per million on a lime stone formation in Illinois and 22,850 lbs on a silicious soil in Lake Co., Ohio.

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## INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

### Emergency Funds

A series of experimental enclosures are being installed at various strategic locations in the Intermountain region. On the Boise Renner is busy erecting four enclosures, one of 200 acres, and three of 20 acres each. Nelson has found it necessary, with the help of S. B. Locke, to protect his reseeding enclosures with deer-proof fence and in some cases with rodent-proof fence. The Manti, Fishlake, Cache, and Uinta forests are cooperating in putting up one or more enclosures, mostly of 10 acres each. These are all tight enclosures with no grazing to be allowed.

A cooperative spring-fall range study has been entered into with the Uinta -Ouray Indian agency, under Supt. H. M. Tidwell. Five small enclosures are being put up and will be studied jointly by C. J. Langer of Mr. Tidwell's office and by Dr. Stewart and G. D. Pickford of the Intermountain Station.

### Influences

During the week April 27 to May 2, F. G. Renner and Dr. Stewart, using the Boise erosion survey data, made correlation studies between the degree of erosion and major factors contributing to erosion. Correlation coefficients (r) and correlation ratios (eta) were both high when the degree of erosion was correlated with total vegetative density, with grass density, with slope of area, with inaccessibility to livestock. The highest correlations obtained were with inaccessibility to livestock strongly corroborating the opinion that grazing was a factor of major influence in hastening erosion.

Pearse reports that the 1931 snow survey of the Boise River watershed shows a decided decrease in snow depth and in water content over that attained in 1930. A summary of the data obtained from three snow courses ranging in elevation from 6100 feet to 8000 feet is given below:

#### Averages from three snow courses

	<u>1930</u>	<u>1931</u>
Snow depth, inches	69.7	55.0
Water content, inches	24.1	20.1
Per cent water content	33.9	36.5
1931 moisture content in per cent of 1930		87.7

Later measurements to determine the rate of melting show a comparatively rapid run-off. At the Trinity Ranger Station course, only 2.2 per cent of the water content had been lost 15 days after melting started in 1930. In 1931, as shown by the second survey, 47 per cent of the water content had been lost 19 days after melting started. In general, weather conditions have been favorable to retard melting and it is believed that the rapid loss of water this year is due mainly to the loose character of the snow.

### Range Research

#### Spring-Fall, and Desert Range

Field work in the desert range project is now under way. From April 20 to 25, a trip was made by Director Forsling, Dr. Stewart and Mr. Pickford to the Colorado River "East" Desert. They were accompanied

by R. W. Bailey, Asst. Professor of Geology of the Utah Agricultural College. It was observed that the winter ranges were closely grazed except far from watering places but that in protected places there was good vegetative production of high-quality forage. It was also observed that gully erosion was unusually active in these tributaries of the Colorado.

Stewart and Pickford, from May 20 to 29, made a more extended trip into the "West" Desert along the Utah-Nevada boundary. A collection of sixty-odd "desert" species was made and a prospective site of a more detailed examination for the vegetation was selected. The available climatic data are being examined with the hope of supplementing in some way these meager data.

The problem of burning to reduce heavy stands of sagebrush on spring-fall range is being further agitated in Idaho. Director Forsling, with J. M. Isaacson, Idaho State Land Commissioner, and several sheepmen, made a trip to examine some ranges in Fremont County, Idaho. In that locality, although there is a fair forage cover, the sage is so thick and so tall as to interfere with sheep grazing, especially during lambing. In view of the uncertainties and dangers which might result, promiscuous burning was disapproved. The State Land Commissioner and the sheepmen are eager to have experiments made to determine advisability of burning.

#### Spring-Fall Range, Idaho

The regular spring vegetative studies being conducted by Craddock at the U. S. Sheep Experiment Station near Dubois, Idaho, has this year been augmented by a fencing program. Two and one-half miles of fence are being constructed to create a number of protected enclosures and to sub-divide a 320-acre pasture into four 80-acre grazing paddocks.

The four new 80-acre paddocks are to be incorporated into a rotation scheme of pasture utilization to investigate the response of native vegetation to such a system of use. Nine 80-acre paddocks which were established in 1923 have each year since been grazed to determine the influence which specific periods of utilization might exert upon the sagebrush-bunchgrass-weed type of spring-fall range, so common to southern Idaho. As empirical studies these grazing schedules have forcefully demonstrated the impracticability of certain methods of range management. None of these schedules, however, actually conformed to the rotation system of range use as it has been applied to the bulk of the station herded range. The creation of the four new paddocks will make it possible to study the operation of the deferred and rotation system of range utilization on a controlled experimental basis and may serve as control for still more intensive physiological studies in the future.

Growing conditions on the Sheep Station range have been slightly above average this spring. There has been an abundance of succulent feed and if moisture conditions prevail a grass seed crop seems inevitable. The herds have handled well and the lambs uniformly look thrifty.

In spite of the disheartening outlook for woolgrowers generally, the Sheep Station personnel (U.S.B.A.I.) are rather proud of the steady progress they are achieving in their breeding studies with range sheep. Through close culling, constructive breeding and careful utilization of the range forage, the average wool clip per head has been raised from approximately 9.5 pounds in 1920-22 to 11.84 pounds in 1930. Although a final analysis has not yet been made of the 1931 clip, the rough figures would seem to indicate the average yield this year may be close to 13.00 pounds.

### Forest Management

Watts and Connaughton have finished the study of melting snow on the Payotte, and Watts completed the extensive revision of forest resources for Region 4, while Connaughton joined the insect crew on the Targhee.

### Biological Investigations

Field work was done during the month of May by Mr. Locke on a check of poison stations in predatory animal control operations in the vicinity of Ely, Nevada, and Henry's Lake, Idaho. Very slight damage to smaller fur bearers was observed.

A talk was given on wild-life conservation at the Bonneville County Sportsmen's Association at Idaho Falls. During a conference in Boise, Idaho, the new state game warden, Mr. M. C. Bailey, indicated an active interest in wild-life research projects and a desire to see such carried out.

Plans have progressed and material delivered on the ground for construction of rodent-proof fences for study plots at the Great Basin Branch Station and on the Boise erosion study area. These fences will be of 1/2-inch diamond mesh wire 36 inches wide, set one foot in the ground with a 6-inch margin bent horizontally in the bottom of a trench and extending outward from the vertical fence. Above the top of the wire and in the same plane is fastened a strip of galvanized valley metal seven inches wide. Some study plots at the Great Basin Branch Station are being made deer-proof by making the fence seven feet high.

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## NORTHEASTERN FOREST EXPERIMENT STATION

The Extensive Revision work was the major activity during May and accounted for practically all of Behre's time as well as much of the time of Westveld and Stickel. Before leaving for the West on a combined holiday and inspection trip, Behre finished compiling the Massachusetts statistics. He likewise was able, assisted by the State Forester and members of the White Mountain National Forest, to secure much of the basic information required for the New Hampshire report. The Vermont statistics obtained by Westveld are almost ready to be transferred to the final report forms. Stickel assisted in the initiation of the revision work in Maine by visits made to the Maine Forest Commissioner's office and private foresters. What information we have been able to secure for Maine is being supplemented by Mr. P. T. Coolidge, consulting forester of Bangor, Maine, whose services the Station has been fortunate to secure.

Jensen attended the Reforestation Conference held on May 15-16 at the Pack Demonstration Forest, Warrensburg, New York. This conference was called by the New York State College of Forestry in order to emphasize to county agricultural agents the need of legislation to insure an enlarged reforestation program in New York. An inspection of various plantations on the Pack Forest brought out the hazards of planting when site conditions are not taken into account. At the conference it was urged that a careful study be made of existing plantations before enlarging on an extensive planting program in New York.

During the month of May Miller received several reports and inquiries regarding rodent damage to seedling stock and young plantations. In most cases the damage had been caused by mice during the winter when they were hard pressed for food. No evidence was found indicating an over-abundance of rodents at the time the damaged areas were examined, signifying that the rodents had been either controlled by natural enemies or that they had migrated to new feeding grounds.

At the request of the Forest Supervisor of the White Mountain National Forest, meteorological stations were established by Barrows at the Gale River and Bartlett Experimental Forests early in May. Each station is equipped with the following set of instruments: an instrument shelter containing a hygrothermograph and sling psychrometer, a 3-cup anemometer, a wind vane, and two Livingston porous bulb atmometers. These stations will serve the dual purpose of furnishing permanent weather records for the experimental forests as well as supplying meteorological information which can be used during the fire seasons.

Westveld in company with Spaulding and MacAloney examined several areas on the Gale River Experimental Forest where a study of the rots of balsam fir is to be initiated this year. The pathological phase of the investigation will be handled by Spaulding while MacAloney will take care of the entomological end.

## NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

The growth phase of the Extensive Revision took practically all of Haig's time and a large part of Weidman's time during May. With the lack of yield tables for several types and the absence of records showing the rate of cutting and even the age class distribution in various ownerships, the job turned out to be surprisingly more difficult than anyone at the Station had anticipated.

An article on growth and yield of western white pine was prepared by Haig early in the month and submitted to the Timberman. This contains a condensed set of yield and stand tables together with a brief discussion of the tables and method of application.

Gisborne reported from Washington that the task of sorting and tabulation the 12,056 fire reports for Region 1 was more than half completed during May. Both Gisborne and Hornby, of the Regional Forester's Office, are giving their full time to this work in the Washington Office. They are using the new 80 place Hollerith machine and have the help of three computing clerks besides the machine operators. As usual, the work was found to be more complex than anticipated, but it is also becoming apparent that the records are even more valuable and consistent than expected. Naturally, many of the facts and conclusions produced agree with experienced opinion, but it should be of practical value to have these facts arrayed for ready inspection by all field men. Several striking conditions have been uncovered to date, some of them not generally recognized nor fully appreciated. No conclusions are being advanced on debatable points until all of the evidence bearing on each condition has been considered.

A few findings of interest, however, may be reported here. One of these is that for the past ten years the Kaniksu Forest has had the most fires per 100,000 acres protected and the Flathead Forest the least. This relation has been true in the typical easy year (average of 23 and 27) the typical average year (average of 21, 22, 24, 25, 28, 30), and the typical bad year (average of 26 and 29). The average annual number of fires per 100,000 acres for the Kaniksu are 12, 15 and 30, and for the Flathead 1, 3 and 3, for these types of seasons - easy, average and bad. The honors (?) for highest average number of fires for any particular 10-day period (indicating concentration and danger of overload) went to Coeur d'Alene in the easy season, the Clearwater in the average season, and to the Kaniksu for the typical bad season. Even if the phenomenal period, July 11 to 20, 1926, were eliminated the Kaniksu still would lead all the other forests in average number of fires in any 10-day period during typical bad years, although the St. Joe and Clearwater then become close rivals.

At the Priest River Branch Station Thompson found May the busiest month he has experienced since he has been on the job. In addition to supervising the activities of a 15-man crew on emergency construction

work involving a variety of improvement projects, he has been carrying on early season fire study measurements, doing some arboretum planting, and acting as host to two groups of forest school students. The senior class of the Montana Forest School accompanied by three faculty members visited the Station for a day and night. The junior class of the Idaho Forest School, led by two instructors, spent their annual two weeks' field trip at the Station at the end of the month.

The present trip of the Idaho students is their fifth annual session at the Priest River Branch Station, which the School now recognizes and advertises as one of its regular field training centers. The students are quartered at the Station for two weeks and are given most of their field instruction on the experimental forest with a few days of timber sale marking and slash disposal on nearby areas within the Kaniksu Forest. The men are shown the more important of the numerous permanent sample plots and experiments in thinning, cutting, reproduction, planting, and fire-weather-fuel inflammability projects. Objectives and results are explained to them and they are required by the instructors to write up their observations. Following that they are given field work in laying out several yield and thinning sample plots and in conducting temporary transect studies of reproduction on old cut-over areas to determine species, amount and origin of reproduction. The purpose is to give them a rudimentary knowledge of the technique of ascertaining facts by research methods. During the first two field trips to the Station three or four Staff members joined the two faculty men in mapping out and conducting the field instruction. In return some work in the way of plot establishment and remeasurement was done for the Station. In recent years the Station's contribution to the student instruction has been cut down to the part time participation of one man for the purpose of conducting the party around to the experiments and helping them in the location of working areas.

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## PACIFIC NORTHWEST FOREST EXPERIMENT STATION

### General

#### Extensive Revision of Capper Report

This project continued to take considerable time of various members of the office but it is now practically completed except for a little work on the part of Johnson which will be added after his study of minor timber products is finished. Requests for information resulting from this statistical revision have come in from several sources and some time was spent in preparing material for Colonel Greeley's use with the Timber Conservation Board, it being understood that the information was not to be released until it had been formally checked by the Washington Office.

## New Quarters

Plans for the Federal Building in which we will be quartered are taking shape rapidly and several conferences have been had with the local architects. The indications are that most of the arrangements and services which the Station is asking for can be provided.

## Experimental Forests

With the approval by the Forester of the Pringle Falls Experimental Forest on the Deschutes National Forest, described in last month's report, the Station feels that an admirable beginning has been made toward concentration of its research and administration on an area of typical Central Oregon Western yellow pine that has great possibilities.

## A Personnel Loss

By arrangement with the Regional Forester, Scientific Aid A. G. Simson has been taken over by that office to succeed Mr. Beatty in the conduct of the radio communication study. It has not been determined whether the arrangement will be permanent or not but Mr. Simson's services as officer in charge of the Wind River Branch and as leader of some of the fire study projects will be very much missed by the Station.

## Visitors

This Station has been favored by an unusually large number of callers, many of them from out-of-town seeking information or discussing common problems. Twenty-seven University of Washington students, led by Professor Alexander called one day and were given a five minute talk by each of several members of the office upon his own field of work. Mr. F. X. Schumacher was here the last few days of the month and made a trip to Wind River with McArdle, and also to the Lewis County Forest Survey cruising with Cowlin.

## Fire Studies

The "hour control" study for the eastern Oregon and Washington forests is rapidly nearing completion. During the month the data for the eastern Oregon forests were combined in one group and a similar combination was made for the Washington forests. Each group has separate analyses for lightning and man-caused fires. These group analyses are more comprehensive than those previously made for single forests; additions to the original working plan accordingly were prepared early in the month. These analyses

already have been used by the Regional Office in establishing hour control and travel time standards for use in the transportation study now in progress at that office. The wisdom of making analyses for individual forests has been fully justified since important differences were found between the same type on different forests. This study will be completed in June.

### Lightning Study

Instructions and report forms for the lightning storm study were sent out during the month and will be placed in the hands of lookouts before they take their posts this summer.

### Smoke Detection Tests

In preparation for a study of maximum distance of detection for small fires which the Regional Office plans to make from lookout stations, tests were made of various artificial smokes. Artificial smoke is used in order to avoid making a large number of fires during the most dangerous part of the fire season. Thus far the most satisfactory smoke is one obtained from the Hitt Fireworks Company, 5224 Thirty-seventh Ave., South, Seattle, Washington. This is a white smoke that from a distance appears to be grayish or bluish. The smoke pots are cardboard cylinders 1 1/2 x 9 inches outside dimensions, ignitable by fuse (or can be arranged for electric or friction ignition) and burn about 2 1/2 minutes. One smoke pot makes approximately as much smoke as a duff and litter fire 10 feet square in dry weather. They cost \$5.50 per dozen, which is rather expensive but probably not unduly so if the expense of thoroughly extinguishing an actual signal fire is considered. Furthermore, there is no danger of fire and an equal volume of smoke can be produced at each setting.

Supervisor Bruckart, Ranger Shepeard and Lookout Weatherill of the Columbia Forest assisted in selecting a suitable smoke. It was astonishing how large the volume of smoke appeared at the point of testing and how small it seemed from a distance of about half a mile, even with direct visibility to the base of the smoke. Mr. Bruckart decided to use some of the smoke pots in connection with his training camps, letting the lookouts see the smoke pots in action at close range and then from a distance of a mile or so. He thought this would be an excellent way to impress upon the lookouts the necessity for "reading" the country very carefully if they expected to pick up small fires. Mr. Shepeard advanced the idea that if lookouts are to do a good job and expect to find small fires they should not be given more country to cover than can be done effectively. In other words, the lookout is a "piece worker" and should not be given too large a task if he is to do good work. This means, of course, the establishment of definite detection areas for lookouts, even though visibility may extend beyond the boundaries of the area assigned to any one lookout.



## Mensuration

The Western Yellow Pine Growth and Yield Study has been temporarily shelved until next winter, so that Meyer may devote his full time to the Forest Survey, becoming thoroughly familiar with all the methods of work in order to be able to supply the best growth predictions when that time arrives. The lately completed yield studies in Douglas fir and the partially completed studies in Western yellow pine will be an invaluable aid in making these predictions.

## Silviculture

### Methods of Cutting Western Yellow Pine

A large part of Kolbe's time during the month was spent in the analysis of the data for the Whitman methods of cutting plots. The reserve stands on the three differently treated areas have given far from satisfactory returns in wood-volume over the fifteen year period since cutting. The growth was quite normal, considering the dry cycle which began approximately when the area was cut, but losses from windfall and insect work have been very severe and much above the average. The proportion lost on a board foot volume basis to that originally reserved on each area is interesting. The proportion of losses for the three 15 acre plots to the initial stand after cutting is shown in the following table:

Plot	Amount of the original volume removed Yellow pine	Amount of initial Reserve Stand lost after		Net increase or decrease in the board foot volume of Reserve Stand after	
		5 years	15 years	5 years	15 years
A	54%	8.6%	13.4%	-5.4%	-2.4%
B	67%	10.2%	18.9%	-6.8%	-6.4%
C	78%	12.3%	16.1%	-7.0%	+4.9%

This table shows the greatest relative losses for the first five year period to occur on the heaviest cut area where the wind apparently had the greatest force. Approximately 3/4 of the volume loss during the first five years on Plot C was caused by windfall. Evidently a young thrifty stand as exemplified by Plot C is not a guarantee against wind damage but it is much more able to withstand insect attack and produce a much greater amount of wood per unit volume.

### Douglas fir Natural Reproduction Studies

During the early part of the month Isaac completed the temperature phases of his manuscript report on the relation of physical factors to

reproduction. Later in the month he went to the Wind River Branch Station to get germination tests under way for the Douglas fir duff storage study, for the Noble fir cold storage study and for the Douglas fir, Sitka spruce, Western hemlock, western red cedar and Engelmann spruce direct seeding studies. Last year the germination tests made in the open beds in the nursery were slightly upset by what appeared to be germination from wind blown seed from surrounding hills. This year shade frames were constructed for the greenhouse and the germination tests started in clean soil inside.

### Wind River Branch

### "Show Mo" Activities

Several individuals and several groups were visitors at Wind River. Early in the month Professor Starker with a class of Oregon State College students made their annual pilgrimage there. A few days later one of the forestry classes of the Portland 4-H Club arrived for a couple of days of sight-seeing and instructions and later Professor Alexander with twenty-seven University of Washington forestry students came for a two days stay. Planting Assistant Will showed them the nursery; Simson gave a talk on weather, fuels and thunder storm prediction and Isaac led a personally conducted tour of the germination and survival studies in the Upper Wind River Valley.

### Arboretum

During the latter part of the month Kolbe spent a few days transferring the arboretum data to newly printed record cards. These are 5 x 7 inches in size and are designed to show origin and parentage, and the treatment given the seedlings or transplants. The back of the card is ruled to permit recording the annual survival and other essential data. The same type of record is to be used at the Portland Civic Arboretum and at Oregon State College's Peavy Arboretum. This is of value as there are considerable exchanges of seeds and plants between these arboreta.

At present we have growing in the arboretum at Wind River a total of 132 species. Generally, there are about twenty specimens of each kind planted. These established groups include 37 pines, 10 spruces, 9 balsam firs and 40 different broadleaf trees. This year 25 lots of coniferous seed were sown in the nursery for future arboretum stock.

### Forest Insurance

During the early part of May the field crew finished Skagit and Snohomish Counties and moved to Grays Harbor County which was very

nearly completed during the remainder of the month.

Work in the office was devoted mainly to the contributive hazard problem with particular reference to the work-up of the data contained in the supplementary individual fire reports. This effort resulted in complete development of the technic of analyzing the statistics and applying the results, and the conclusions have been embodied in a draft of another chapter of the working plan report covering this phase. Considerable progress has been made toward the development of proper technic for the causative hazard phase of this study.

The climatic study has progressed steadily during the month, and the assembling of the data for Oregon will be completed by Field Assistant Taylor by the end of the first week in June. Collection of data now completed includes precipitation, drought, relative humidity and wind. Temperature and evaporation figures are being worked on at the close of the month.

A copy of the full report on the Forest Fire Insurance Congress at Paris in May 1930 has been received and is proving to be well worth time spent with it. While the details of the insurance problem in France are, of course, different in many ways from ours, it is nevertheless plain that their identification of the fundamental requirements is practically identical. Chronologically they are quite considerably further advanced, however.

## Economics of Forestry

### Selective Logging

Rapid progress has been made in the logging cost studies during the month with up to fourteen field assistants working under the direction of Brandstrom. So far studies have been made at five logging operations using a variety of equipment, caterpillars, steel spar skidders of various types, Washington slack line machine, Clyde high load donkey and Diesel cold-decker, etc. At one operation study a skidder with a normal crew yarded and loaded 93 cars, aggregating about 976,000 feet of logs in 8 1/4 hours. The time study crew also got data on this machine when it was operating under more normal conditions than on the day of this record breaking output. Office work has been carried on currently with the field work and interesting results are already showing up. The Director spent a day with the study crews on each of two skidder sides at the Crown Willamette Paper Company operation.

### Douglas fir Mill Scale Studies

There have been several conferences both in Portland and Seattle between Colonel Greeley, Professor Kirkland, Mr. Brandstrom, Mr. Hessler,

who is to conduct these studies and the Director as to the terms of cooperative agreement and the technic of the studies. Already runs aggregating about 1,250,000 feet have been made at two of the Weyerhaeuser mills and cooperation covering two other mills has been promised in the amount of \$1300.

## Office of Products

### Survey of Sawmill Waste in the Douglas Fir Region

The entire month of May was devoted by Hodgson to the preparation and completion of his office report dealing with this project. This report, from which a manuscript for publication will be extracted, is entitled "A General Survey of Sawmill Waste in the Douglas Fir Region of Oregon and Washington". It consists of some 60,000 words, 36 tables (eleven of which are large photostatic reductions), two diagrams, one map, 48 photographs and seven pages of appendix. The report is divided into four main sections which are: "Introduction", "Methods Used in Conducting the Survey", "Findings of the Survey" and "Conclusion and Recommendations".

The section "Findings of the Survey" is sub-divided into the following main subdivisions: - "Conversion Factors Relating to Sawmill Waste and to Products Made From It", "Sawmill Waste and Its Present Utilization as Actually Found by Intensive Studies", and "Estimate of Sawmill Waste and Its Present Utilization for the Region".

The latter sub-division shows that the total volume of normal sawmill waste resulting from the manufacture of rough-green lumber by the sawmills of the Douglas fir region during 1929 amounted to 619,065,157 cubic feet (solid measure). It is also shown that 44 per cent of this material is recovered and sold as by-products, 29 per cent of it is used by the sawmills themselves as fuel for the production of domestic power and live steam, and 27 per cent of it is being destroyed in the refuse burners. This subdivision also shows that the total sale value, F.O.B. sawmill of all by-products made from normal sawmill waste and from sawmill waste in excess of normal in 1929 amounted to \$8,196,554.00.

### Extensive Revision of the Capper Report

Johnson spent a large portion of the month writing the Products portion of the extensive revision report for Region Six. In this connection, it was estimated that the total annual drain on the forests of Oregon and Washington amounted to about 2,937 million cubic feet of wood. Of this drain, commercial timber operations accounted for 12 1/2

billion feet of sawtimber and 162 million cubic feet of cordwood material. Drain from insects, wind and disease amounted to 947 million feet of sawtimber and 40 million cubic feet of cordwood. Average annual loss from fire was about 363 million feet of sawtimber and 70 million cubic feet of cordwood.

#### Minor Forest Products Study

Some time was spent by Johnson on this study. In the course of a recent trip, it was found that one concern is paying \$175 per M bd. ft. for bigleaf maple veneer logs producing highly figured veneers. These logs are usually cut into 1/28-inch veneer, the bulk of which is shipped to eastern furniture manufacturers and used for overlays and inlays in high-grade furniture.

Another concern is paying \$75.00 per M for Oregon white oak logs, 14 to 16 feet long, straight and clear. These logs are cut into timbers and used largely in the pulp and paper mills of this region for machinery foundation purposes.

#### Felling and Bucking Study

Rapraeger has practically completed the final report on the time study of felling and bucking. The costs per unit output in felling and working decrease markedly with increase in tree size. Bucking costs, on the contrary, reach a minimum value at 42" D.B.H. for Douglas fir after which increases occur with an increase in tree size, the reason being that breakage is heavy in merchantable portions of larger trees. One, two, and often three extra cuts are necessary to buck out shattered portions. Elimination of avoidable breakage is an important factor meriting consideration in a well-managed Douglas fir camp which wishes to conserve wood material and lower production costs.

#### 1930 Census of Lumber, Lath and Shingles

With the exception of a few small companies, cutting less than 500 M bd. feet annually, the 1930 survey has been completed. To date 1854 schedules have been forwarded to Washington.

#### Forest Survey

The Forest Survey organization is concentrated on the stripping of Lewis County, Washington in order to insure the early completion of that project. Several of the five field parties are now working the more

inaccessible parts of the county using packers and camping near the line. All field work will be completed about the middle of June. The office compilation of the results of both the stripping and compilation methods of making the inventory of the timber resources of the county is making progress also and it will be possible to make a comparison of results soon after the field work of stripping is completed.

The Director spent a day with one of the strip crews and another day with Girard and Kline on the adjustment cruising; Andrews has spent considerable time with the Lewis County strip crews.

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### SOUTHERN FOREST EXPERIMENT STATION

#### General

Demmon, with State Forester Merrill, appeared before the Mississippi Research Commission meeting at Jackson. Their cooperation on our Forest Survey work was sought. In New Orleans, Demmon attended the organization meeting of the forestry sub-committee of the Industrial Advisory Committee of the Association of Commerce. He gave a talk on the work of the Station before the Lausda Club. Demmon delivered a paper on "Research Aids to Georgia Forest Owners" at a meeting of the Georgia Forestry Association.

Several members of the Bureau of Chemistry and Soils visited Lake City in search of a suitable location for their branch station. Olustee and one or two other localities near Lake City were inspected in company with Wyman, Harper, and Hadley. The location at Olustee was favored.

Junior Forester Wheeler joined the Hardwood Survey crew at Lake Providence, Louisiana on May 18. He has recently returned from Brazil, where he had been working with Mr. Cox until the outbreak of the revolution.

R. D. Garver, of the Forest Products laboratory, spent several days with Lentz, Putnam, and Lehrbas getting familiar with the Hardwood Survey for the purpose of coordinating the plans for the hardwood mill scale study with the Survey plans. Several mills operating in northern Louisiana were visited and plans were made at one mill for a study early this fall.

#### Management

Wahlenberg spent the first half of the month at Urania with Heyward re-examining reproduction quadrats. Maps of all were made on new record forms having several advantages over the large field sheets used previously. They provide larger scale maps on transparent sheets. Superimposed sheets

may now be used to compare current with earlier records, thus eliminating a certain amount of office copy work. The field technique has also been improved. All seedlings on the permanent plots are now marked for the first time with individual wire pins. This should make future examinations more rapid and accurate.

During the last half of the month, Wahlenberg and Heyward tested the application of Dunning's tree classification to virgin shortleaf trees on the Ouachita National Forest.

Denmon spent a few days with the management crew. At this time it was decided to abandon the idea of making methods of cutting studies in virgin timber on the Ouachita by the sample plot method. The great diversity of the forest has also necessitated postponing any formal reservation of an experimental forest area within the national forest.

Chapman and Averell re-examined sample plots and added some girdling and poisoning tests to the silvicultural improvement experiment on Muddy Creek, Ouachita National Forest, Arkansas. The new plots are to test spring season work with the chemicals previously found most promising.

### Forestation

Wakeley compiled seed data and has nearly completed the portion of his bulletin text dealing with seed.

At Camp Pinchot, Gemmer tested the "Council" planting bar and the "Speedy Seedling Setter" of the Union Fork and Hoe Company. Examinations of exotic plantations, and cone counts, were made.

### Naval Stores

At the Starke branch, the trees on the burned plot at Raiford again produced 20 per cent more gum than those on the unburned site.

Busch believes that trees chipped once a week with quarter-inch streaks do not yield as much as they would with wider streaks because of gum soaking. The same situation holds as a general rule for those chipped only twice a week. Therefore, it is planned to take one of the groups chipped twice a week and put half-inch in place of quarter-inch streaks on them.

Wyman's series of scrape articles is now completed and ready for publication. A chapter of the Naval Stores Handbook was prepared and submitted to Miss Gerry, while she and Dr. Cary assisted in the revision of another chapter.



Colonel Benedict visited the Starke branch regarding starting French face work on his timber. Mr. Derbisher, of the Budd Company at Middleburg, called with a new adze suitable for chipping French faces. As this tool shows some promise, one of them will be obtained for trial. Other visitors during the month were C. H. Coulter, Dr. Black, from Gainesville, Dr. Veitch, Dr. Skinner and Mr. Shingler of the Bureau of Chemistry and Soils, Congressman Green, Mr. L. A. Taylor, dry-kiln expert, and Mr. Budd.

### Erosion

In northern Mississippi, Sinclair established a series of run-off and erosion plots at the Holly Springs Branch. This series will be used to study erosion and run-off occurring under different types of land use or vegetative cover found in that part of the Silt Loam Uplands of Mississippi. The plots will be established on ten per cent slopes, keeping all other factors as uniform as possible. Plots three by twelve feet will be isolated by galvanized iron strips sunk about six inches in the ground. A tank buried at the lower end of each plot will catch the run-off and erosion from single storms. Sinclair, with Olsen's help, established four plots under the following conditions: (1) A twenty-year black locust-osage orange plantation, (2) a scrub oak-brush woodland cover, (3) an improved and terraced pasture, and (4) an unburned broomsedge grass cover commonly found on abandoned farms. Five more plots are planned to complete the series.

Meginnis returned to New Orleans on May 30 after spending two months on detail at the California Station working under Dr. Lowdermilk. A brief stop was made en route at the Intermountain Station to visit the Ephraim Canyon erosion and run-off project that has been carried on in the Wasatch Mountains for the past fifteen years. A hurried trip was also made over a portion of the Boise River watershed where a critical erosion situation exists.

### Economics

Bond and Reynolds started field work on a study of the financial aspects of forestry in Polk County, Texas. This is to be a cooperative study with State Forester Siecke and the Economics Department of the Agricultural Experiment Station. The project will involve (1) the financial aspects of farm woodlands, and (2) the financial situation of large second growth pine holdings.

The extensive revision of the Capper Report required an unexpected amount of time due to the very involved details.

## Hardwood Survey

The field crews have continued their preliminary work in East and West Carroll Parishes, Louisiana, finishing eight out of ten strips by June 1. Schumacher, after spending a week in these Parishes on field methods, helped Survey men in New Orleans to formulate an office procedure in the compilation of data.

The tentative procedure adopted for use on the preliminary survey of East and West Carroll Parishes is designed to give average results, and an index of the reliability of each average, for the following classes of information:

1. The land area phase of the analysis will give the acreage of forest and non-forest land. Areas of forest land in each site, type, and forest condition will be determined, as well as areas of forest land in the several classes of stocking.
2. Stand tables showing the number of trees by diameter classes and species will give average stand condition on the various sites, types, and forest conditions.
3. Average merchantable volume by species groups will be calculated.
4. Growth will be determined by species, and the growth of the individual species combined to give growth per acre under varying site, type, and condition.

Temporary clerical help has been employed to copy the field data onto summary sheets, from which certain data will be transferred to tabulating cards for the electric sorting and tabulating machine.

## Ecology

Pessin spent the month at McNeill, Mississippi, on root and light competition studies.

The experiments at McNeill have been attracting considerable attention recently because some of the findings, particularly in the grazing phase, are contrary to statements still used by various forest agencies in public relations work.

During the month the following men visited the experimental area: F. B. Merrill and H. W. Givens, of the Mississippi State Forest Service; D. T. Yarnall; and Doctors E. S. Hathaway and W. T. Penfound of Tulane University, and Dr. Ellinor H. Behre of Louisiana State University.

## Forest Pathology

Inspections of several national cemeteries in the states of Louisiana, Mississippi, Alabama, and Florida with reference to the trees and shrubs in these localities were started in May. The inspections are being made for the War Department and are a part of a general project to improve the condition in these cemeteries. National cemeteries at Baton Rouge and Chalmette, Louisiana were examined.

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### RESEARCH ACTIVITIES IN REGION 2

Ranger Fletcher, who had been assigned to the staff of the experiment station since January, was transferred to his district on the Washakie Forest on the first of the month. On the twenty-eighth, Ranger Smith left Colorado Springs for his new assignment in charge of the timber survey project on the Alpine District of the Uncompahgre Forest. He had been assigned to the experiment station since Feb. 1. With the departure of these temporary assistants, the staff of the station was again reduced to its normal operating status of two men.

All of Smith's time during the month was given to the task of mapping and inventorying the stand on various plots upon which cutting had been done within the past two years on the Fremont Experimental Forest. Eight .9 acre plots in Block A were completed, which concluded the preliminary work in this management unit and similar work was accomplished on one plot of Block C, leaving two to be completed this spring to finish the work on this unit. Smith was assisted one day by the junior class of the Colorado College Department of Forestry. Professor Wagar, who directs the department's field work in Manitou Park, had charge of the student party.

Roeser spent about 60% of his time at Fremont. The early part of the month was given to lining out the work in connection with the station Forest management project (M-1) and marking the balance of the stand to be cut in Block C. Following this a considerable period was spent in studying the sample trees representing the 2-0 stock developed from the 1928 seed crop from the selected Nebraska western yellow pine seed trees in the seed source study. The chief item of this study entailed the procuring of dry weights of these sample trees; 246 trees being involved. No time has been found to undertake a statistical analysis of the data, but it is interesting to note that the average full tree dry weights of the 18 lots varied between 1.84 grams and 8.06 grams per tree, which is a rather significant difference. It is noteworthy in this connection that the parent trees of the heaviest and lightest average stock are located within eight miles of each other. The difference in weight is, therefore, not an expression of geographical variation, but entirely one of variation in individual vigor.

Some idea, however, of the effect of geographical distribution, is offered by the following data:

Distance from Bessey Nursery (Miles)	No. of lots represented	No. of trees represented	Average Dry Weight per tree (grams)
65	6	120	4.22
165	9	165	2.91
250	3	31	2.34

During the month, the spring observations of flower production of Douglas fir were started. The flowering season occurred about normally, with heavy crops on all trees. By the eighteenth emergence had occurred up to about 8300'. A spring storm of extraordinary proportions struck the Pikes Peak region during the next five days, bringing 40.0 inches of snow, or 34.5% of the total for the winter, and freezing temperatures of 20° F. for three successive days at Fremont (8900'). During this period, snow fell in Colorado Springs (6000'). As a result, the loss of the flower and resulting cone crop has varied from approximately 50% to 100%, depending upon the relative elevation of the tree. It is impossible at this time to determine the full effect of the storm upon the crop, since many of the flowers, particularly at the lowest elevations, appear to be in a condition of suspended development - apparently alive but not growing.

At the higher elevations, above 8500', the storm had little effect. Practically none of the trees had produced flowers, and what is more significant, very few will develop any crop. The most likely explanation of this lies in the development of an excessive crop of vegetative buds last year, following the severe winter freeze of 1929-30, which resulted in the destruction of almost the entire bud crop of this species and an almost complete lack of growth during 1930. Evidently, the development of this large crop of vegetative buds precluded the development of flower buds.

The storm prevented field work at Fremont for about a week, Roeser took advantage of this period to prepare a report and map recommending the withdrawal of 500 acres to be included within the Fremont Experimental Forest. The report is now being typed and will be submitted shortly.

Following the storm and prior to Smith's departure, the entire staff was engaged in the job of resurveying the north half of management unit Block B at Fremont. This work was made necessary by conflicts in the original surveys which called for the readjustment of plot boundaries in anticipation of the extension of management and regulation activities into this area.

Plans were made during the Month for Jay Higgins to be employed in erosion studies during all or the greater part of the field season.

MANUSCRIPTS

Pacific Northwest

- H. J. Andrews      Adjustment or Check Cruising on the Forest Survey in the Douglas Fir Region. (For Department of Agriculture Yearbook.)
- R. W. Cowlin      Problems in type mapping. (For Department of Agriculture Yearbook,)
- W. H. Bolles      Memorandum Report on Field Work in Cowlitz County, Washington. (For Progress Report for Forest Survey.)
- The Forest Survey. (For the "Idaho Forester".)
- P. D. Kemp      Memorandum Report on Field Work in Linn County, Oregon. (Progress report for Forest Survey.)
- R. E. McArdle      A Bark Blazer for Marking Trees. (For the Journal of Forestry.)
- W. H. Meyer      First report on the Mt. Hood permanent sample plots in even-aged Douglas fir.
- First report on the Wanoga Butte permanent sample plots in even-aged western yellow pine.
- Report on the 1930 remeasurements of the Cascade permanent sample plots in second growth Douglas fir.
- Bark thickness and bark volume of western yellow pine.
- Effect of release upon the form and volume of western yellow pine.

Northeastern

- P. W. Stickel.      Restocking Blight-killed Chestnut Lands in the Northeast with Pine (For Yearbook.)
- " " "      Predicting Forest Fire Hazard in the Northern Forests of New York (For Yearbook).

Appalachian

- Nelson, R. M.      Basal fire wounds on trees in the Southern Appalachians, and  
Sims, I. H.      (Submitted to U.S.D.A. for yearbook.)

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and  
Barrett, L. I.

IN PRINT

Bates, C. G.                      A New Principle in Seed Collecting for Norway  
Pine. (Jour. For. May, 1931)

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(Jour. For. May, 1931, p. 831)

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Sample Plots (Jour. For. May, 1931, p. 821)

"        "        "                      Climatological Charts for the Allegheny Forest  
Region. (Mo. Wea. Rev. Jan. 1931)

Winters, Robt. K.                  Review; Generalizations of the Normal Curve  
of Error, by Louis R. Salvosa (Jour. For. May,  
1931. p. 846)

Zon, Raphael and  
Russell N. Cunningham              Logging Slash and Forest Protection.  
(Research Bulletin 109 of the Wis. Agr.  
Expt. Station.)

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